



UNITED STATES PATENT AND TRADEMARK OFFICE

ee

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/542,663	07/18/2005	Tetsuya Inui	63825(70904)	1815

21874 7590 11/15/2007
EDWARDS ANGELL PALMER & DODGE LLP
P.O. BOX 55874
BOSTON, MA 02205

EXAMINER

SINGAL, ANKUSH K

ART UNIT PAPER NUMBER

2823

MAIL DATE DELIVERY MODE

11/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/542,663

Applicant(s)

INUI ET AL.

Examiner

Ankush k. Singal

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 10-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 07/18/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-9 are drawn to a method of manufacturing a crystallized semiconductor device, classified in class 438 subclass 486.
- II. Claim 10 is drawn to product by process element classified in class 257 subclass 66.
- III. Claims 11-15 are drawn to a apparatus for crystallization classified in class 372, subclass 39+.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made.

The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the device in claim 10 can be made by another method including heating the semiconductor layer.

3. Inventions I and III are related as process and apparatus for its practice.

The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by

Art Unit: 2823

hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus of claim 11 can be used for general diffusion of impurity material.

4. Inventions II and III are related as apparatus and product made. The inventions in this relationship are distinct if either or both of the following can be shown: (1) that the apparatus as claimed is not an obvious apparatus for making the product and the apparatus can be used for making a materially different product or (2) that the product as claimed can be made by another and materially different apparatus (MPEP § 806.05(g)). In this case the apparatus of claim 11 can be used for general diffusion of impurity material.

5. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

6. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art due to their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

Art Unit: 2823

7. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

During a telephone conversation with David G. Conlin on Tuesday 26,2007 a provisional election was made without traverse to prosecute the invention of Group I, claim 1-10, but the examiner while examiner found that claim 10 is a product by process claim and claims 1-9 are method claims, so examiner is considering the method claims to be examined. Affirmation of this election must be made by applicant in replying to this Office action. Claim 10 and 11-15 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

8. Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or invention to be examined even though the requirement be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention or species may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse.

Art Unit: 2823

9. Should applicant traverse on the ground that the inventions or species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions or species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C.103(a) of the other invention. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Objections

10. Claim 1 is objected to because of the following informalities: In line 6 of claim 1, the term "...diffusion layer on a surface..." should be replaced by "...diffusion layer on the surface...".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 2823

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1-4 ,7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Okumura Nobu (JP 09-092839).

Re. claim 1, Okumura teaches a method of manufacturing a crystallized semiconductor device comprises the steps of:

(i) forming a amorphous silicon film(9)(same as semiconductor layer) on a insulating substrate(same as substrate)(1)(Para[0029],line 1-2);

(ii) Irradiating the amorphous silicon film(9)(same as semiconductor layer) with laser light so as to crystallize the amorphous silicon film(9)(same as semiconductor layer).

(iii) forming a translucency film(3)(same as thermal diffusion layer)(3) on a surface of the amorphous silicon film(9)(same as semiconductor layer)(Para[0030]). It is apparent to have the thermal conductivity of the translucency film higher than that of the substrate (For example if the translucency film is silicon nitride than the thermal conductivity is 30.1 and for substrate such as glass it is 1.1).

Art Unit: 2823

in the step (ii), the amorphous silicon film(9)(same as semiconductor layer) being irradiated with the laser light from above the translucency film(3)(same as thermal diffusion layer)(3)(Para[0031]).

Re. claim 2, Okumura teaches the step of eliminating the translucency film(3)(same as thermal diffusion layer)(3) after the step(ii)(Para[0032] ,line 1-2).

Re. claim 3, Okumura teaches having the laser light irradiating in the translucency film (same as thermal diffusion layer)(3) without absorption which makes it apparent to have the translucency film (same as thermal diffusion layer)(3) optical absorptivity lower with respect to the laser light than the amorphous silicon film(9)(same as semiconductor layer) where the light is absorbed, which makes it apparent to have the amorphous silicon film(9)(same as semiconductor layer) with higher optical absorptivity.

Re. claim 4, Okumura teaches having laser light having a wavelength of 308nm(which is less than 550 nm) is used in the step(ii).

Re. claim 7, Okumura teaches having a silicon dioxide layer between the substrate(1) and the amorphous silicon film(9)(same as semiconductor layer)(Para[0029],line 1-2). It is apparent to have the thermal conductivity layer of silicon dioxide, which is a layer between the substrate and amorphous silicon film(9)(same as semiconductor layer) and has a lower thermal conductivity than

Art Unit: 2823

the thermal conductivity of the substrate(For example if the layer between the substrate and semiconductor layer is silicon dioxide, it has a thermal conductivity of 0.59 and is lower than the thermal conductivity of glass which is 1.1).

Re. claim 8, Okumura teaches having the translucency film (same as thermal diffusion layer)(3) made of silicon nitride(Para[0053],line 1-3) which makes it inherent to have the optical transmittance of the translucency film (same as thermal diffusion layer)(3) with respect to the laser light is 70% or more.

Re. claim 9, Okumura teaches having the translucency film (same as thermal diffusion layer)(3) made of silicon nitride as an alternative to the instant invention(Para[0053],line 1-3).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

Art Unit: 2823

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

17. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura Nobu (JP 09-092839) in view of Yamazaki(US PUB 2007/0020826).

Art Unit: 2823

Re. claim 5, Okumura Nobu (JP 09-092839) discloses all the limitations as discussed above in claim 1 and 4 except having the laser light within the wavelength of 350nm or more.

However, Yamazaki discloses having the laser light having the wavelength of 400nm to 700nm(same as 350nm or more)(Para[0033],line 1-2).

It would have been obvious for one with ordinary skill in the art at the time the invention was made to modify Okumura Nobu (JP 09-092839) in view of Yamazaki(US PUB 2007/0020826) to have the laser light with wavelength of 350nm or more to crystallize the amorphous semiconductor film(Para[0032],line 12).

Re. claim 6, Okumura Nobu (JP 09-092839) discloses all the limitations as discussed above in claim 1 and 4 except having the laser light being visible light.

However, Yamazaki discloses having the laser light being visible light(Para[0014],line 1-4).

It would have been obvious for one with ordinary skill in the art at the time the invention was made to modify Okumura Nobu (JP 09-092839) in view of Yamazaki(US PUB 2007/0020826) to have the laser light being visible light to make it applicable from a view point of absorption coefficient of the

Art Unit: 2823


semiconductor when a semiconductor film formed on a substrate or a semiconductor region separately formed is heated selectively(Para[0014],line 4-7).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ankush k. Singal whose telephone number is 5712701204. The examiner can normally be reached on monday-friday 7am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MATTHEW SMITH can be reached on (571)272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ankush Singal


MICHELLE ESTRADA
PRIMARY EXAMINER